

CLAIM AMENDMENTS

1-22 (cancelled)

23.¹ (Currently Amended) An ethylene copolymer which is a copolymer of ethylene and an α -olefin of 3 to 20 carbon atoms and has the following properties:

(a) the melt index (MI2) at 190°C under a load of 2.16 kg is in the range of 0.0001 to 1000 g/10 min,

(b) the density is not more than 0.899 g/cm³,

(c) the relationship between a vinyl group amount and MI2 of the polymer satisfies the following expressions:

~~(vinyl group amount: number of vinyl groups/1000 carbon atoms) ≤ 0.018038+0.003259xlog(MI2), and~~

~~(vinyl group amount: number of vinyl groups/1000 carbon atoms) ≤ 0.004509+0.000815xlog(MI2),~~

and

(d) the relationship between a vinylidene group amount and MI2 of the polymer satisfies the following expressions:

~~(vinylidene group amount: number of vinylidene groups/1000 carbon atoms) ≤ 0.018038+0.003259xlog(MI2), and~~

~~(vinylidene group amount: number of vinylidene groups/1000 carbon atoms) ≤ 0.013528+0.002445xlog(MI2).~~

24.² (Currently Amended) An ethylene copolymer which is a copolymer of ethylene and an α -olefin of 3 to 20 carbon atoms and has the following properties:

(a) the melt index (MI2) at 190°C under a load of 2.16 kg is in the range of 0.0001 to 1000 g/10 min,

(b) the density is in the range of 0.875 to 0.899 g/cm³, and

(c) the relationship between a vinyl group amount and MI2 of the polymer satisfies the following expression expressions:

~~(vinyl group amount: number of vinyl groups/1000 carbon atoms) ≤ 0.018038+0.003259xlog(MI2), and~~

~~(vinyl group amount: number of vinyl groups/1000 carbon atoms) ≤ 0.004509+0.000815xlog(MI2).~~

25.³ (Previously presented) An ethylene copolymer which is a copolymer of ethylene, an α -olefin of 3 to 20 carbon atoms and a cycloolefin and has the following properties:

(a) the cycloolefin content is not less than 0.01 % by mol,

(b) the melt index (MI2) at 190°C under a load of 2.16 kg is in the range of 0.0001 to 1000 g/10 min,

(c) the relationship between a vinyl group amount and MI2 of the polymer satisfies the following expression:

~~(vinyl group amount: number of vinyl groups/1000 carbon atoms) ≤ 0.018038+0.003259xlog(MI2),~~

and

(d) the relationship between a vinylidene group amount and MI2 of the polymer satisfies the following expression:

(vinylidene group amount: number of vinylidene groups/1000 carbon atoms) $\leq 0.018038+0.003259\times\log(\text{MI2})$.

~~26.~~⁴ (Previously presented) The ethylene copolymer as claimed in claim 25, wherein the ethylene copolymer further has the following properties:

the relationship between a vinyl group amount and MI2 of the polymer satisfies the following expression:

(vinyl group amount: number of vinyl groups/1000 carbon atoms) $\leq 0.004509+0.000815\times\log(\text{MI2})$,

and

the relationship between a vinylidene group amount and MI2 of the polymer satisfies the following expression:

(vinylidene group amount: number of vinylidene groups/1000 carbon atoms) $\leq 0.013528+0.002445\times\log(\text{MI2})$.

~~27.~~⁵ (Previously presented) The ethylene copolymer as claimed in any one of claims ~~25~~¹ to ~~26~~⁴, wherein regio-regularity of the α -olefin of 3 to 20 carbon atoms, as measured by ^{13}C -NMR, satisfies the following expression:

$$\text{T}\alpha\beta / (\text{T}\alpha\beta + \text{T}\alpha\alpha) \leq 0.25 - 0.0020x$$

wherein $\text{T}\alpha\beta$ is a peak intensity of a carbon atom having branches at the α -position and the β -position in the ^{13}C -NMR spectrum, $\text{T}\alpha\alpha$

is a peak intensity of a carbon atom having branches at both of the α -positions, and x is an ethylene content (% by mol) in the polymer.

~~28.~~⁶ (Previously presented) The ethylene copolymer as claimed in claim ~~28~~,¹ wherein regio-regularity of the α -olefin of 3 to 20 carbon atoms, as measured by ^{13}C -NMR, satisfies the following expression:

$$T\beta\gamma / (T\beta\gamma + T\beta\beta) \leq 0.30 - 0.0015x$$

wherein $T\beta\gamma$ is a peak intensity of a carbon atom having branches at the β -position and the γ -position in the ^{13}C -NMR spectrum, $T\beta\beta$ is a peak intensity of a carbon atom having branches at both of the β -positions, and x is an ethylene content (% by mol) in the polymer.

~~29.~~⁷ (Previously presented) The ethylene copolymer as claimed in claim ~~28~~,¹ wherein the molecular weight distribution (M_w/M_n), as measured by GPC, is in the range of 1.2 to 10.

~~30.~~⁸ (Previously presented) The ethylene copolymer as claimed in claim ~~28~~,¹ wherein the molecular weight distribution (M_w/M_n), as measured by GPC, is in the range of 1.6 to 10.

~~31.~~⁶ (Previously presented) The ethylene copolymer as claimed in claim ~~23,~~¹ which satisfies the expression $MI10/MI2 < (Mw/Mn) + 5.55$.

~~32.~~¹⁰ (Currently Amended) The ethylene copolymer as claimed in claim ~~23,~~¹ which satisfies the expression $MI2 > 19.009 \times (\eta)_n - 5.2486$ where η is intrinsic viscosity determined by the formula $\eta = \eta_{sp} / (C(1+0.28\eta_{sp}))$ where η_{sp} is specific viscosity and C is solution concentration g/dl as measured in decalin at 135 °C at a concentration of about 1 mg/ml.

~~33.~~¹¹ (Previously presented) The ethylene copolymer as claimed in claim ~~23,~~¹ wherein the ash content in the ethylene copolymer is not more than 1000 ppm.

~~34.~~¹² (Previously presented) The ethylene copolymer as claimed in claim ~~23,~~¹ wherein the titanium element content in the ethylene copolymer is not more than 10 ppm, and/or the zirconium element content in the ethylene copolymer is not more than 10 ppm.

~~35.~~¹³ (Previously presented) The ethylene copolymer as claimed in claim ~~23,~~¹ which is a copolymer prepared by forming not less than 50 % of chain transfer by the addition of hydrogen.

~~36.~~¹⁴ (Previously presented) A molded product comprising the ethylene copolymer of claim ~~23~~¹.

~~37.~~¹⁵ (Previously presented) A resin modifier comprising the ethylene copolymer of claim ~~23~~¹.

~~38.~~¹⁶ (Currently Amended) A composition comprising the ethylene copolymer of claim ~~23~~¹, optionally together with a thermoplastic polymer.

~~39.~~¹⁷ (Previously presented) The composition as claimed in claim ~~38~~¹⁶, wherein the thermoplastic polymer is a polyolefin.

~~40.~~¹⁸ (Previously presented) The composition as claimed in claim ~~38~~¹⁶, wherein the weight ratio of the ethylene copolymer to the thermoplastic polymer is in the range of 0.01/99.99 to 99.99/0.01.

~~41.~~¹⁹ (Previously presented) A molded product comprising the ethylene copolymer composition of claim ~~38~~¹⁶.

~~42.~~²⁰ (Previously presented) An ethylene copolymer which is a copolymer of ethylene and an α -olefin of 3 to 20 carbon atoms and has the following properties:

(a) the melt index (MI2) at 190°C under a load of 2.16 kg is in the range of 0.0001 to 1000 g/10 min,

(b) the density is not more than 0.899 g/cm³,
(c) the relationship between a vinyl group amount and MI2 of the polymer satisfies the following expression:

(vinyl group amount: number of vinyl groups/1000 carbon atoms) ≤ 0.018038+0.003259×log(MI2),

and

(d) the relationship between a vinylidene group amount and MI2 of the polymer satisfies the following expression:

(vinylidene group amount: number of vinylidene groups/1000 carbon atoms) ≤ 0.018038+0.003259×log(MI2), and

wherein the ash content in the ethylene copolymer is not more than 1000 ppm.

~~43.~~ ²¹ (Previously presented) An ethylene copolymer which is a copolymer of ethylene and an α -olefin of 3 to 20 carbon atoms and has the following properties:

(a) the melt index (MI2) at 190°C under a load of 2.16 kg is in the range of 0.0001 to 1000 g/10 min,

(b) the density is not more than 0.899 g/cm³,

(c) the relationship between a vinyl group amount and MI2 of the polymer satisfies the following expression:

(vinyl group amount: number of vinyl groups/1000 carbon atoms) ≤ 0.018038+0.003259×log(MI2),

and

(d) the relationship between a vinylidene group amount and

MI2 of the polymer satisfies the following expression:

(vinylidene group amount: number of vinylidene groups/1000 carbon atoms) $\leq 0.018038+0.003259 \times \log(\text{MI2})$, and

wherein the titanium element content in the ethylene copolymer is not more than 10 ppm, and/or the zirconium element content in the ethylene copolymer is not more than 10 ppm.

~~44. 22~~ (Previously presented) An ethylene copolymer which is a copolymer of ethylene and an α -olefin of 3 to 20 carbon atoms and has the following properties:

(a) the melt index (MI2) at 190°C under a load of 2.16 kg is in the range of 0.0001 to 1000 g/10 min,

(b) the density is not more than 0.899 g/cm³,

(c) the relationship between a vinyl group amount and MI2 of the polymer satisfies the following expression:

(vinyl group amount: number of vinyl groups/1000 carbon atoms) $\leq 0.018038+0.003259 \times \log(\text{MI2})$,

and

(d) the relationship between a vinylidene group amount and MI2 of the polymer satisfies the following expression:

(vinylidene group amount: number of vinylidene groups/1000 carbon atoms) $\leq 0.018038+0.003259 \times \log(\text{MI2})$,

which is a copolymer prepared by forming not less than 50 % of chain transfer by the addition of hydrogen.